

## THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method for directing a seeker to a target, the method including the steps of:
  - 5 (a) making one or more observations associated with the target (target observations); and
  - (b) generating a route based on the one or more observations and estimated error distributions of the one or more target observations.
- 10 2. A method according to claim 1 wherein the target is a radio terminal and the target observations are radio signal parameters.
3. A method according to claim 2 wherein the one or more target observations are made by the radio terminal.
- 15 4. A method according to claim 2 wherein the one or more target observations are made by a device external to the radio terminal.
5. A method according to claim 2 wherein the one or more target observations are made by both the radio terminal and a device external to the radio terminal.
- 20 6. A method according to any one of claims 4 or 5 wherein the device external to the radio terminal is a base transceiver station.
- 25 7. A method according to claim 1 wherein the one or more target observations are made within a communications network.

8. A method according to claim 1 wherein the estimated error distribution is calculated using a method dependant on a characteristic of the target observations.
- 5 9. A method according to claim 2 wherein the estimated error distribution is calculated using a method dependant on a characteristic of the environment of the radio terminal.
10. A method according to claim 1 further including the step of;  
10 (c) determining whether the target is stationary or not and modifying the route accordingly.
11. A method according to claim 1 wherein the location of the seeker is known and is a constraint on the setting of a route to the target.
- 15 12. A method according to claim 7 wherein the at least one or more target observations are made within a cellular communications network.
13. A method according to claim 1 further including the step of  
20 (c) making one or more observations associated with the seeker (seeker observations).
14. A method according to claim 13 wherein the seeker makes the one or more seeker observations.
- 25 15. A method according to claim 14 wherein errors in the target observations and the seeker observations are correlated.
16. A method according to claim 2 wherein the target observations are  
30 transmitted to the seeker.

17. A method according to claim 16 wherein the target observations are transmitted to the seeker by the radio terminal.
- 5 18. A method according to claim 15 wherein the seeker makes at least one common observation with the target.
19. A method according to claim 18 wherein the seeker controls the observations made by the radio terminal to maximise commonality between the target  
10 observations and the seeker observations.
20. A method according to claim 13 wherein the route generated results in reducing a distance between the seeker and the target thus increasing the commonality between the seeker observations and the target observations.  
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21. A method according to claim 20 wherein once there exist sufficient common observations between the seeker observations and the target observations, the method includes using differences between the common target observations and seeker observations to generate the route to direct the seeker to the target.  
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22. A method according to claim 2 wherein the one or more target observations include network terminal ID, signal strength and/or timing measurements.
23. A method according to claim 2 wherein the route generated is overlaid on a  
25 topographical map of a region containing at least one of the target and seeker.
24. A method according to claim 23 wherein the topographical map includes streets.
- 30 25. A system for implementing the method according to any one of claims 1 to 24.
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26. An apparatus for implementing the method according to any one of claims 1 to 24.
- 5 27. A homing device for use in the system of claim 24.
28. A method for directing a seeker to a target, the method including the steps of:
- (a) making one or more observations associated with the target (target observations); and
- 10 (b) generating a route based on the one or more observations and estimated error distributions of those target observations to provide likely locations of the target.
- 15 29. A method according to claim 28 wherein the seeker is first directed to the most likely location of the likely locations and then to subsequent most likely of the likely locations.
30. A method according to claim 28 wherein the estimated error distributions are calculated using a probability density function.
- 20 31. A method according to claim 29 wherein the seeker has a position capability and is presented with directional information to follow the route.
- 25 32. A method according to claim 29 wherein the seeker is presented with information directing the seeker to a first landmark on the generated route, followed by subsequent landmarks along the route once the seeker has arrived at a given landmark.
- 30 33. A method according to Claim 31 or 32 wherein the route includes streets.

34. A method for directing a seeker to a target, the method including the steps of:

- (a) making one or more observations associated with the target (target observations);
- (b) making one or more observations associated with the seeker (seeker observations); and
- (c) generating a route based on a comparison of the one or more target observations and seeker observations and estimated error distributions of those one or more target and seeker observations.

35. A method according to claim 34 wherein the observations include attributes of radio frequency signals around the seeker and the target respectively.

36. A method according to claim 35 wherein the comparison provides directional information to guide the seeker towards the target.

37. A method according to claim 36 wherein the directional information includes direction cosines of a vector between the seeker and the target.

38. A method according to claim 35 wherein the seeker observations and the target observations are made by the seeker and the target respectively.

39. A method according to claim 38 wherein the seeker is directed so as to increase the commonality of the seeker and target observations.

40. A method according to claim 39 wherein the seeker makes observations of the same signals as the target.

41. A method according to claim 40 wherein the seeker instructs the target to make particular observations.
42. A method according to claim 40 wherein the seeker is instructed to make observations of the same signals as the target.
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43. A method according to claim 40 wherein upon sufficient commonality between the seeker observations and the target observations, the seeker is directed according to a route determined by using differences between the common target observations and seeker observations.
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44. A method according to claim 34 wherein the target is a radio terminal in a radio communications network.
45. A method according to claim 44 wherein the radio communications network is a cellular radio communications network.
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46. A method according to claim 34 wherein the seeker is moving and seeker observations are filtered over time to reduce spatially uncorrelated errors in the seeker observations.
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47. A method for directing a seeker to a target, the seeker able to receive signals directly from the target to provide direct target observations, the method including the steps of:
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- (a) making one or more observations associated with the target (target observations);
  - (b) making one or more observations associated with the seeker (seeker observations); and
  - (c) generating a route based on a comparison of the one or more target observations, the seeker observations, the direct target

observations and estimated error distributions of the at least one or more target and seeker observations.

48. A method according to claim 47 including, upon determining that a sufficient  
5 Line of Sight exists between the seeker and the target, determining a Line of Bearing to refine the route.

49. A method according to claim 47 wherein the direct target observations  
10 includes field strength measurements.

50. A method according to claim 47 wherein the direct target observations  
includes time of arrival measurements.

51. A homing device for finding a target, the homing device including:  
15 a receiver for receiving signals surrounding the homing device and for measuring at least one selected attribute of those signals to produce homing device observations; and

an output for providing route information to a user to find the target;  
wherein

20 the route information is determined by comparing the homing device observations with target observations derived from measuring at least one selected attributes of signals associated with the target and estimated error distributions of the at least one measured selected attribute of the signals associated with the target.

25 52. A homing device according to claim 50, wherein the receiver also receives information from a homing system.

53. A homing device according to claim 51 wherein the route information is  
30 received from the homing system.

54. A homing device according to claim 51, further including a processor for calculating the route information.
- 5 55. A homing device according to claim 51 wherein the output provides the route information in the form of audio information.
56. A homing device according to claim 51 wherein the output provides the route information as visual information.
- 10 57. A homing device according to claim 56 wherein the visual information is a map showing the route overlaid on the map.
58. A homing device according to claim 51 further including a compass to provide device orientation information in conjunction with the route information.
- 15 59. A homing device according to claim 51 wherein the receiver also receives signals directly from the target to provide direct target observations and wherein the determination of the route information includes the direct target observations.
- 20 60. A homing device according to claim 59 further including a directional antenna for obtaining a measurement of a bearing to the target.
- 25 61. A homing device according to claim 51 further including a transmitter for transmitting information to the homing system.
62. A homing device according to claim 51 further including a transmitter for transmitting control information to the target.
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63. A homing device according to claim 51 wherein the receiver also receives control information from the homing system.
64. A method for directing a seeker to a target, the method including the steps of:
- 5           (a)     calculating at least one probable location of the target; and
- (b)     generating a route to direct the seeker to a most probable of the at least one probable locations.
65. A method according to claim 64 wherein a plurality of probable locations is
- 10       calculated, and wherein the seeker is directed first to the most probable location, followed by subsequent most probable locations, until the target is located.
66. A method according to claim 64 wherein the route is generated to direct the
- 15       seeker along a minimum distance to the at least one probable location.
67. A method according to any one of claims 28, 34 or 47 wherein the route generated takes into account a travel distance to provide a minimum distance for the seeker to travel to find the target.
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